**Remarks**

The Office Action dated July 28, 2004 has been received and duly noted. The claims have been reviewed and amended to further distinguish the invention from the cited references.

The specification has been amended at page 7 commencing at line 4 to delete the reference to a corrosion resistant alloy or stainless steel being generically referred to as stainless steel. Both the specification and the claims discuss the option of the inlay being a corrosion resistant alloy or a stainless steel, and do not refer to both options as stainless steel. The specification also have been amended at page 8 commencing at line 27 to clearly recite a maximum expansion coefficient of the steel body, and to recite the conventional working temperature range for that expansion between 0°F and 350°F. The claims as filed, such as dependent Claim 9, provide support for this amendment to the specification.

With respect to amended Claim 1, Stephenson discloses a composite sealing ring which may be coated or optionally provided with a corrosion-resistant alloy. A significant difference between Claim 1 and Stephenson, however, is that Claim 1 recites that the body of the metal sealing ring is a carbon steel body, while the body of the ring according to Stephenson comprises a stainless steel body. See Col. 3, line 46. It is thus apparent that Stephenson is not concerned with problems induced by thermal expansion of the metal seal ring which is different from that of the carbon steel tubulars. Amended Claim 1 recites that the body of the sealing ring is formed from carbon steel and has an expansion coefficient which is less than 6.5E-6 inches/inch/°F. Most importantly, the anticipated expansion coefficient of the metal body is thus not appreciably more than the anticipated expansion coefficient of the carbon steel tubulars which are sealed by the seal ring.

Applicant respectfully submits that Stephenson is thus not faced with the problem addressed by Applicant, namely to provide a highly reliable sealing ring which

does not lose its sealing effectiveness due to a significant difference in thermal expansion of the ring body compared to the tubulars being sealed by the sealing ring. Applicant respectfully submits that the combination set forth in Amended Claim 1 is not shown or suggested by Stephenson, which in fact teaches away from the solution by utilizing a stainless steel body which is outside the thermal expansion recitation recited in Claim 1.

U.S. Patent 6,722,426 is clearly distinguishable from amended Claim 1. First, the reference does not teach or suggest providing a stainless steel or corrosion-resistant alloy inlay, and instead teaches providing an molybdenum sulfide coating. Molybdenum sulfide is a crystalline material used as a lubricant to reduce wear and friction, and this friction reducing material is neither stainless steel nor a corrosion-resistant alloy. As defined by the American Petroleum Institute in its Specification for Subsea Wellhead and Christmas Tree Equipment, a corrosion-resistant alloy is a non-ferrous alloy where any one or the sum of the specified amount of the following alloy elements exceed 50%: titanium, nickel, cobalt, chromium and molybdenum. According to Claim 1, the corrosion-resistant alloy or stainless steel inlay is welded to the carbon steel body of the sealing ring, while the lubricant provided by this reference cannot be welded to the carbon steel body and instead is applied by an adhesion process to form a coating. Welding utilizes the fusion of materials and provides significantly improved and long term sealing reliability compared to a coated material, such as disclosed in this reference. A coating may be scraped off, while a welded inlay provides the strong fusion bond to the body. Amended Claim 1 should be distinguishable from the cited references.

With respect to dependent Claims 4-6, the Examiner recognizes that Stephenson does not disclose the inlay requirements of these claims, but contends that the dimensions are a design choice discoverable by routine experimentation. Applicant respectfully submits that the specific requirements of Claims 4-6 are not merely a

matter of design choice, and that the stated relationships were not discovered by routine experimentation. Rather, taking into consideration the goals of the composite metal sealing ring with a carbon steel body and the inlays, these claims each set forth a feature of an inlay which is preferred. The cited relationships are not merely a matter of design choice, but are important to achieve the intended expansion coefficient for the composite sealing ring. There is nothing in the record to suggest that the ranges recited in Claims 4-6 were arrived at by routine experimentation, and instead were derived to better satisfy the objective of a sealing ring with a composite thermal expansion which is close to that of the tubular being sealed by the sealing ring.

With respect to dependent Claims 7 and 8, the Examiner recognizes that Stephenson does not disclose a coating over the inlays, and contends that Tillman teaches inlays 31 and 32. These components are seals, however, not inlays. Also, Tillman teaches providing a coating to provide a tighter joint, but Applicant provides a fluid tight joint with the inlay, and the coating provides corrosion resistance, reduced friction and protection against galling. Nothing in the cited reference suggests the combination of a sealing ring as set forth in Claim 1 along with the corrosion resistant coating as set forth in Claims 7 and 8.

With respect to dependent Claim 10, Sweeney does not disclose a corrosion resistant inlay comprising stainless steel or a corrosion resistant alloy for sealing with the backup sealing surface, but instead provides a thin coating which does not have the durability of an inlay welded into the carbon steel body.

Independent Claim 12 has been amended to recite that the stainless steel or corrosion-resistant alloy is secured to the metal body by welding. The Examiner notes that Stephenson also does not disclose the inlay thickness required by this claim, but considers that a matter of design choice. This position is contested by Applicant. The inlay thickness set forth in amended Claim 12 maximizes the significant benefit of having a composite ring with an expansion coefficient which is closely adjacent that of

carbon steel. This benefit is clearly not recognized by Stephenson, which instead utilizes a stainless steel material ring. As discussed above, the thickness of the inlay set forth in Claim 12 is not a matter of design choice, but rather achieves the fundamental benefits of long term sealing reliability with reasonable thermal expansion compared to the goods being sealed. Amended Claim 12 also recites that the expansion coefficiency of the metal body is less than 6.5E-6 inches/inch/°F, which is substantially less than the thermal expansion coefficient of stainless steel used for the sealing body as taught by Stephenson. The components being sealed are defined as first and second members, and are not limited to tubular members.

The features of dependent Claims 13, 14 and 16 are discussed above.

Independent method Claim 17 has been amended to recite providing a steel body for the sealing ring, welding at least one of the first and second inlays comprising stainless steel and a corrosion-resistant alloy to the steel body to define the respective sealing surface, and recites the expansion coefficient of the steel body is less than 6.5E-6 inches/inch/°F. The members being sealed are not limited to tubular members. Applicant submits that Claim 17 is not disclosed or suggested by Stephenson for reasons discussed above.

The features in dependent Claims 20-24 and 26 are discussed above.

Independent Claim 28 has been amended to recite the first inner sealing surface is one of stainless steel and carbon resistant inlay welded to the first member and defining the first inner sealing surface, and specifies another inlay formed from stainless steel or a carbon resistant alloy welded to the carbon steel body, the another inlay defining the first outer sealing surface on the steel body. This combination of inlays on both the seal ring and the member being sealed by the seal ring is not disclosed or suggested in the prior art. Amended Claim 28 should be patentable over the cited references.

Dependent Claims 30 and 31 recite a second outer sealing surface on the steel

body for sealing with a second inner sealing surface of a second tubular member having a bore aligned with the steel body central bore. Dependent Claim 31 recites a second corrosion resistant inlay defining the second outer sealing surface on the steel body. The features set forth in Claims 30 and 31 are not shown in the prior art. Amended Claim 33 recites the second outer sealing surface on the steel body opposite the first outer sealing surface for sealing with a second body, and recites that the second body comprises a flange. This combination also is not suggested in the cited references.

Independent Claim 35 recites the combination of a first conical outer sealing surface on a primary metal body for sealing with the first conical primary inner sealing surface, and a first conical backup outer sealing surface on a backup metal body for sealing with the first conical backup inner sealing surface, with the first conical backup inner sealing surface being spaced from a cone defining the first conical primary inner sealing surface. Claim 35 similarly recites a second conical primary outer sealing surface on the primary metal body for sealing with the second conical primary inner sealing surface, and a second conical backup outer sealing surface on the backup metal body for sealing with the second conical backup inner sealing surface, the second conical backup inner sealing surface being spaced from a cone defining the second conical primary inner sealing surface. Claim 35 further recites a primary and a backup corrosion resistant inlay each comprising one of a stainless steel and a corrosion resistant alloy secured by welding to the respective primary and backup metal body, which each comprise a carbon steel or a low alloy steel. The primary inlay defines a respective first or second conical primary outer sealing surface and has a nominal inlay thickness between about 1/32" to 3/16". The backup inlay defines a respective first or second conical backup outer sealing surface and has a nominal thickness between about 1/32" to 3/16". Finally, Claim 35 recites an expansion coefficient of each of the primary metal body and the backup metal body is less than

body for sealing with a second inner sealing surface of a second tubular member having a bore aligned with the steel body central bore. Dependent Claim 31 recites a second corrosion resistant inlay defining the second outer sealing surface on the steel body. The features set forth in Claims 30 and 31 are not shown in the prior art. Amended Claim 33 recites the second outer sealing surface on the steel body opposite the first outer sealing surface for sealing with a second body, and recites that the second body comprises a flange. This combination also is not suggested in the cited references.

Independent Claim 35 recites the combination of a first conical outer sealing surface on a primary metal body for sealing with the first conical primary inner sealing surface, and a first conical backup outer sealing surface on a backup metal body for sealing with the first conical backup inner sealing surface, with the first conical backup inner sealing surface being spaced from a cone defining the first conical primary inner sealing surface. Claim 35 similarly recites a second conical primary outer sealing surface on the primary metal body for sealing with the second conical primary inner sealing surface, and a second conical backup outer sealing surface on the backup metal body for sealing with the second conical backup inner sealing surface, the second conical backup inner sealing surface being spaced from a cone defining the second conical primary inner sealing surface. Claim 35 further recites a primary and a backup corrosion resistant inlay each comprising one of a stainless steel and a corrosion resistant alloy secured by welding to the respective primary and backup metal body, which each comprise a carbon steel or a low alloy steel. The primary inlay defines a respective first or second conical primary outer sealing surface and has a nominal inlay thickness between about 1/32" to 3/16". The backup inlay defines a respective first or second conical backup outer sealing surface and has a nominal thickness between about 1/32" to 3/16". Finally, Claim 35 recites an expansion coefficient of each of the primary metal body and the backup metal body is less than 6.5E-6 inches/inch/°F.

The combination set forth in the Claim 35 is distinguishable from each of the references cited by the Examiner. None of the cited references teach the combination as set forth in Claim 35, including first primary and backup sealing surfaces on the primary and backup metal bodies for sealing engagement with the respective first primary and the first backup inner sealing surfaces on the first member, and second primary and backup sealing surfaces on the primary and backup metal bodies for sealing engagement with the respective second primary and second backup inner sealing surfaces on the second member, each backup inner sealing surface being spaced from a cone defining the respective primary sealing surface. Claim 35 further sets forth a nominal inlay thickness of the corrosion resistant inlay which is not shown in the prior references, and specifies that an expansion coefficient of the metal body is less than 6.5E-6 inches/inch/°F.

Dependent Claims 36-39 set forth features discussed above. Dependent Claim 40 recites the first inner sealing surface has one of a stainless steel and a corrosion resistant alloy inlay welded to the first member and defining the first inner sealing surface. The combination set forth in these claims is not suggested by the cited references.

In view of the above, early allowance of the Application is requested.

Respectfully submitted,

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